Public Health Briefs

Height, Weight and Skinfold Thickness of Michigan Adults

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Abstract: Height, weight, and selected skinfold measurements were taken on 544 Michigan males and 557 females age 18 and over. Mean body weight showed a tendency to increase with age for both sexes up to age 64 while mean height progressively decreased from its maximum at age 18-24 years. Between ages 18 and 64 years, mean triceps skinfold thickness of men increased 10 per cent, female triceps skinfolds 50 per cent. Mean subscapular skinfold values rose consistently with age for both sexes. Comparison of these findings with those from earlier national studies suggest that Michigan adults are heavier and fatter but no taller than other US adults. (Am J Public Health 1980; 70:1290-1292.)

Introduction

Recently we had the opportunity to determine various anthropometric measurements of a sample of adults from the State of Michigan. Among 15 anthropometric measurements for estimating total body fat were height, weight, and triceps and subscapular skinfolds, which are the subject of this report.

Methods

In order to identify a representative population, the Institute for Social Research (The University of Michigan) pro-

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vided a sample of telephone numbers from approximately 3,000 households distributed throughout the State of Michigan. Different sampling rates were selected for the four different identified regions, in order that the various regions would have a more even distribution of survey participants. This deviation from a more straightforward probability sample does not necessitate the addition of weights in any analysis to prepare State estimates. Thus, the total sample population is known to fairly represent the State of Michigan.

Of the adults willing to participate, a total of 1,231, including 1,101 White persons (544 males and 557 females), had anthropometric measurements. Time limitations prohibited taking measurements on all available subjects and although the proportion of the sample composed of Blacks (6 per cent) was appropriate for the State, too few individuals had anthropometric measurements to provide meaningful information.

Body measurements were made at various times of the day at each of the different examination sites throughout the State. Examinations were conducted between May and August, 1978. Each subject wore a disposable cloth gown weighing approximately 60 grams. Height was measured to the nearest millimeter using a stadiometer according to the procedure described by the National Center for Health Statistics.² Body weight was determined on a physician's scale to the nearly 0.25 pound then converted to kilograms. Triceps and subscapular skinfold measurements were taken using Lange calipers. Skinfold locations and measurement techniques were in accordance with those described by Behnk and Wilmore.3 The sites were first marked with a dermographic pencil, then measured twice to the nearest 0.5 mm. In the event that the two measurements at any one site differed by more than 0.5 mm, a third measurement was taken and the three values averaged. Test-retest reliability exceeded r = .95, with the largest error of estimate being no higher than ± 1.0 mm.

A one-way analysis of variance (ANOVA) was utilized to determine age group and sex differences for skinfold thickness data.

TABLE 1—Sample Sizes, Means, Standard Deviations and Medians for Body Weight of Michigan Adult Males and Females, 1978

Age Groups (years)	N	Mean	SD	Median
Male		(kg)		(kg)
18-24	63	76.1	12.17	74.4
25-34	135	79.9	14.65	75.6
35-44	117	81.7	14.55	79.8
45-54	92	81.2	13.45	81.2
55-64	66	82.0	12.11	80.3
65+	71	75.8	13.52	74.3
All ages	544	79.8	13.86	77.8
Female				
18-24	69	59.2	10.10	57.4
25-34	133	64.6	13.25	61.0
35-44	101	66.9	15.70	63.0
45-54	100	68.3	14.67	65.8
55-64	94	70.8	14.37	67.8
65+	60	64.8	13.00	62.9
All ages	557	66.1	14.17	63.0

TABLE 2—Sample Sizes, Means, Standard Deviations and Medians for Height of Michigan Adult Males and Females, 1978

Sex and Age (years)	N	Mean	SD	Mediar	
Male		(cm)		(cm)	
18-24	63	177.0	6.23	176.8	
25-34	135	177.2	6.45	176.6	
35-44	117	175.5	6.30	175.6	
45-54	92	175.0	8.69	175.5	
55-64	66	173.6	5.59	173.5	
65+	71	172.0	7.47	171.0	
All ages	544	175.3	7.06	175.4	
Female					
18-24	69	164.0	6.91	163.7	
25-34	133	162.6	6.29	162.2	
35-44	101	162.0	8.58	162.4	
45-54	100	161.3	5.98	161.1	
55-64	94	159.6	4.58	159.5	
65+	60	157.6	5.95	157.1	
All ages	557	161.4	6.74	161.2	

Results

For ease of comparison, subjects were placed into one of six age groups (18-24, 25-34, 35-44, 45-54, 55-64, 65 + years). Sample sizes, means, standard deviations, and medians for weight and of height of Michigan adult men and women by age group are presented in Tables 1 and 2. Table 3 presents findings of triceps and subscapular skinfold measurements.

Discussion

Between 1971 and 1974, the National Center for Health Statistics conducted the National Health and Nutrition Ex-

amination Survey (NHANES I) which examined various health parameters of the United States citizens.² Among those parameters was a series of anthropometric measurements including height, weight, and triceps and subscapular skinfolds. Comparisons of the present data (1978) with those of NHANES I (1971-1974) reveal that Michigan adults are virtually identical in height. The mean height of Michigan adult males was different by less than 0.1 cm compared with men throughout the United States (Michigan men = 175.3 cm; HANES men = 175.25 cm). The differences for women were equally close with the average height of Michigan females being 161.4 cm in comparison with 161.5 cm for women sampled by NHANES I.

When body weight was compared, Michigan men were on the average 1.8 kg heavier than US men. Michigan wom-

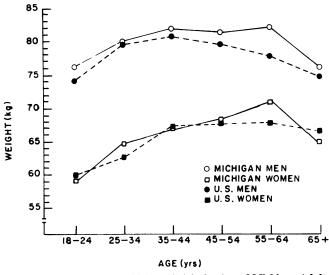


FIGURE 1—Comparison of Mean Weight by Age of Michigan Adult Men and Women with US Men and Women

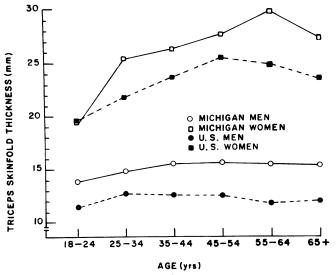


FIGURE 2—Comparison of Mean Triceps Skinfolds by Age of Michigan Adult Men and Women with US Men and Women

TABLE 3—Sample Sizes,	Means,	Standard	Deviations	and	Medians	for	Triceps and	Sub-
scapular Skinf	olds for	Michigan N	Male and Fe	male	Adults, 19	78	-	

Sex and Age (years)		Triceps				Subscapular		
	N	Mean	SD	Median	N	Mean	SD	Median
Male		(mm)		(mm)		(mm)	-	(mm)
18-24	60	`13.9 [′]	7.07	`12.0 [′]	39	14.3	7.25	`12.0 [′]
25-34	132	14.8	7.61	12.2	99	17.4	8.87	14.8
35-44	114	15.5	6.57	14.8	93	18.3	7.98	16.3
45-54	90	15.6	5.24	15.0	71	20.0	7.86	18.3
55-64	66	15.4	5.63	14.0	52	21.1	8.74	18.8
65+	69	15.3	6.26	14.3	38	19.2	8.53	16.8
All ages	531	15.1	6.55	14.2	392	18.5	8.44	16.8
Female								
18-24	69	19.4	6.64	19.8	58	13.3	8.00	10.2
25-34	133	25.5	8.29	23.5	104	18.1	10.22	15.0
35-44	101	26.3	8.97	24.8	87	19.0	11.36	16.0
45-54	99	27.6	7.54	26.2	86	21.0	11.32	18.8
55-64	94	29.7	7.95	30.0	63	22.2	10.50	21.0
65+	60	27.2	7.18	26.5	40	21.8	9.85	20.8
All ages	556	26.1	8.41	24.8	438	19.1	10.73	16.2

en were also heavier than US women by 1.2 kg. Examination of Figure 1 shows that differences in weight for both sexes were most pronounced among those age 55-64 years where males from Michigan were 4.1 kg heavier than NHANES I men and Michigan women were 3.3 kg heavier than N-HANES I women.

Examination of skinfold data (Figures 2 and 3) reveals that White Michigan men and women included in the 1978 survey appear fatter than their US counterparts.* At all age groups, with the exception of females at 18-24 years, triceps and subscapular skinfolds are greater for Michigan adults.

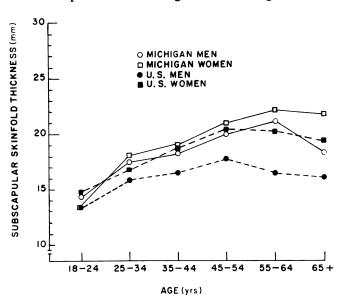


FIGURE 3—Comparison of Mean Subscapular Skinfolds by Age of Michigan Adult Men and Women with US Men and Women

Males and females deposit fat in different areas of the body as they get older. However, no statistically significant subscapular skinfold differences were found among sexes for any age group. When examining the triceps data (Figure 2), men do not significantly increase this skinfold thickness throughout adult life. Although the triceps skinfold thickness of women is greater (P < .05) than that of men in the early age group (18-24 years), women continue to deposit significant amounts of subcutaneous fat in this region over time (p < .05).

In summary, it appears that White Michigan adults studied in 1978 are heavier and fatter but no taller than their US counterparts studied in 1971-1974. It is quite possible, however, that the differences between Michigan and US adults with respect to body weights reflect a gradually increasing adiposity of the general US population over time. If this is the case, one expects that NHANES II will find increases in body weight and skinfold thickness among US adults. This will be of some interest in view of the decreasing mortality rate from cardiovascular disease during the past decade.⁴

REFERENCES

- Michigan Department of Public Health: A Survey of the General Population of Michigan for Health Effects of Polybrominatedbyphenyl Exposure. Environmental Sciences Laboratory, NY, 1979.
- National Center for Health Statistics: Weight and Height of Adults 18-74 Years of Age: United States, 1971-74, Vital and Health Statistics. PHS Pub. No. 79-1659, Series 11, No. 211, DHEW, Hyattsville, MD, 1979.
- Behnke AR and Wilmore J: Evaluation and Regulation of Body Build and Composition. Englewood Cliffs: Prentice Hall, 1974.
- Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention. DHEW (PHS) Pub. No. 79-55071, Washington, DC, 1979.

^{*}Unpublished skinfold data for US adults provided by National Center for Health Statistics from NHANES I, 1971-1974.